NZCC and ACCC Information Request

NECG analysis of competitive detriments and public benefits of the proposed Alliance between Qantas and Air New Zealand

1 Background information regarding the NECG analysis

The NECG analysis provided to the NZCC and ACCC in spreadsheet form relies on a number of inputs and assumptions. This section outlines the information utilised in NECG's analysis and provides a brief summary of this information.

■ Average fares for 2001/02

Average fares for 2001/02 are calculated as the weighted average of Air NZ and Qantas average yields for 2001/02, where the weights used are the Air NZ and Qantas passenger volumes. Average fares were calculated based on a sector revenue analysis to June 2002 provided by Qantas and the financial results for 2001/02 provided by Air New Zealand. To make the passenger revenue figures for Qantas and Air New Zealand comparable, Air New Zealand's gross passenger revenue figures were discounted by standard commissions, non-cash adjustments and foreign gains and losses. In Air NZ's financial results for domestic New Zealand, no corresponding category for non-cash adjustment or foreign exchange gains and losses exist. Based on our discussions with Air NZ staff it was determined that foreign exchange for domestic was irrelevant and that travel cards (the only relevant non-cash adjustments for domestic) amounted to $19.27 million of the total commercial adjustments in the domestic EBIT file. Air New Zealand could not break down this figure by city-pair so we applied the total ratio to all city-pairs.

■ Price elasticity of demand

Neither Qantas nor Air NZ had empirically estimated the price elasticity of demand for passenger air travel on the affected city-pairs. Hence, we relied on estimates that Air NZ uses for internal modelling purposes. These are –0.7 for business passengers and –1.65 for leisure passengers.

These price elasticity of demand estimates were weighted based on the share of business and leisure passengers on each city-pair. These shares were provided to us as an input by Air NZ.

- Base case passenger volumes

Base case passenger volumes were calculated by multiplying base case capacity for Qantas and Air NZ by current load factors for Qantas and Air NZ for each city-pair to determine Qantas and Air NZ passenger volumes. Passenger volumes for all airlines operating on the city-pair were then estimated by dividing Qantas and Air NZ passenger volumes by Qantas and Air NZ capacity share. Both the schedules used to determine base case capacity and the Qantas and Air NZ load factors were provided to NECG as an input by the airlines.

- Base case capacity volumes

As discussed above, capacity volumes were calculated based on base case schedules provided to us by the airlines.

- Capacity elasticity

A capacity elasticity is used in the model to estimate the increase in passenger volumes stimulated as a result of an improvement in flight frequency. A capacity elasticity of 0.125 was adopted based on a study by Gillen, Harris and Oum (1997)[1]. As capacity is higher under the counterfactual than the factual, the inclusion of a capacity elasticity results in higher passenger volumes in the counterfactual and hence increases the net detriment associated with the proposed Alliance. The use of a capacity elasticity will overstate the estimated detriments of the proposed Alliance to the extent that the proposed Alliance results in the removal of wing-tip flying rather than a reduction in flight frequency and hence quality of service.

- Natural rate of demand growth

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[1]   Gillen, D., Harris, R. & Oum, T. 1997, 'Assessing the Benefits and Costs of International Air Transport Liberalization', Draft Final Report, July 31, p. 11.

The natural rate of demand growth is used in the model to uplift the base case capacity and base case passenger volumes. The demand growth rates were taken from a 2002 Tourism Forecasting Analysis undertaken by Covec.[2]

- Passenger shares by country of origin

Passenger shares by origin country for the Tasman sectors were sourced from Statistics New Zealand for the year ended June 2002. This data is based on arrival and departure card information collected from passengers entering and leaving the country. The passenger shares by country of origin for all other sectors are calculated as the weighted average of Air NZ and Qantas passengers, based on their origin as recorded by the airlines. Statistics NZ data could not be used for these sectors, as the data does not accurately capture passengers transiting through intermediary countries, passengers that catch connecting international flights or passengers doing multiple stop journeys.

- VBA cost savings

To reflect the lower cost nature of the VBA entrant, a factor reduction of 20% was applied to the costs of the VBA. This figure was considered reasonable by the airlines.

- VBA+ cost savings

To reflect the lower costs associated with the operation of Air NZ's Express service in domestic NZ, we reduced Air NZ's domestic costs by a factor of 7.5% based on information provided to us by Air NZ.

- NZ Express price reduction

As the average fares in the model are based on historic information they do not capture the impact on fares of the NZ Express product. Hence, we reduced the domestic NZ airfares by a factor of 20% to reflect the NZ Express product, based on information provided to us by Air NZ.

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[2]   Covec 2002, 'International Visitor Arrivals to New Zealand', 2002–8, http://www.covec.co.nz/pdf/tourism_visitor_arrivals.pdf.

- Average tourist spend by region

The average tourist spend by region was provided by Tourism Futures International (TFI), using NZ and Australian Government sources. However neither TFI nor NECG could source any data for New Zealand resident expenditure on overseas trips other than Australia. This expenditure was calculated based on the ratio of New Zealander's spend in Australia ($1,632), compared to Australian's spend in New Zealand ($1,770) which equals 92%. This ratio was then applied to Australians spend overseas ($3,748) to calculate New Zealanders spend overseas ($3,476).

- Foreign tourist split

The change in visitor numbers that the Cournot model produces is used to calculate a tourism impact for Australia and New Zealand. The variance in visitor numbers is categorised as New Zealand, Australia and foreigners based on historic passenger origin shares. On the Tasman sectors it is assumed that New Zealander's originate in New Zealand, and Australians in Australia. However there is no data which records where the foreign passengers travelling between Australia and New Zealand originate (i.e. whether it is Australia or New Zealand). We have therefore assumed that 50% originate in each country.

- Factual schedules

The factual schedules detail the number of flights by city-pair and aircraft type that Qantas and Air NZ would operate in the future with the Alliance. The schedule for Qantas and Air NZ were provided to NZ by the airlines. The schedules for all other airlines were taken from the base schedules and uplifted by the rate of natural demand growth. The schedule for the VBA was developed by Qantas and Air NZ based on their experience of VBA entry and consideration of the schedules that they proposed to operate under the factual.

- Counterfactual schedules

The counterfactual schedules detail the number of flights by city-pair and aircraft type that Qantas and Air NZ would operate in the future without the Alliance. These schedules for Qantas and Air NZ were provided to NECG on a confidential basis by each airline. Each airline was asked to provide their schedule based on what they believe the other airline would do. Hence, Air NZ provided to us a schedule for themselves and for Qantas, reflecting what they believed Qantas would do in the absence of the Alliance. Qantas did the same. NECG then compared the schedules, which aligned very closely, and produced a single counterfactual schedule. Where the schedules provided by the airlines differed we

adopted the schedule of the airline that would operate the flights. For example, where Air NZ's schedule for Qantas differed from the Qantas schedule prepared by Qantas, we adopted the latter for Qantas.

The schedules for all other airlines were taken from the base schedules and uplifted by the rate of natural demand growth. Hence the schedules for all other airlines, with the exception of the VBA, are the same in the factual and the counterfactual. The VBA schedule was scaled back in the counterfactual to reflect the higher level of capacity that exists under this scenario.

- Unit costs

Unit costs for both Qantas and Air New Zealand were calculated based on each airlines' financial results for 2001/02. Each cost item in the accounts, with the exception of aircraft related costs and overheads, was assigned one of three cost drivers – departures, blockhours or passengers. The cost drivers were matched as closely as possible to the way the airlines allocate costs for the purposes of examining route profitability. The costs allocated to each cost driver were then summed and divided by the value of the cost driver. For example, all cost items allocated to departures were summed to get a total departure-related cost and then this value was divided by the number of departures to arrive at a cost per departure.

These calculations were undertaken at the level of major routes – Tasman, domestic New Zealand, short-haul Pacific, long-haul Pacific, Asia and Atlantic – and aircraft type. Where no historic information was available for a route or aircraft type they were approximated based on another route. In particular, Qantas does not currently operate A330 aircraft and hence has no historic information which can be used to derive unit costs. Hence, we uplifted Qantas' 767 departure and blockhour costs by 16% to estimate the cost of A330 aircraft, based on Qantas' view of the cost differential. Similarly, Air NZ does not currently operate A320 aircraft and hence a similar uplift approach was used. In this case Air NZ advised that the departure and blockhour unit costs for a 737 should uplifted by 14% to approximate the unit costs for an A320.

Two further adjustments were made to the unit cost calculation to address anomalies in the information identified by PWC in their audit. The first adjustment was to Qantas 747 fuel costs on the Tasman, which appeared inconsistent with fuel costs on other routes because of the way in which Qantas allocates costs between multi-sector flights (for example SYD-AKL-LAX). Hence, fuel costs for the Tasman were approximated with fuel costs on the AKL-SYD city-pair. The second adjustment was to landing fees for Air NZ 744s on the Tasman. Air NZ agreed that this cost was incorrect in their historical accounts and hence was

approximated by applying the Atlantic 747 Air NZ/Qantas ratio to the Qantas Tasman 747 costs.

■ Block hours

Blockhours by aircraft type and city-pair were provided by Air NZ.

■ Capital costs

Capital cost tables including number of aircraft, asset life and average age were provided to us by the airlines for the factual and counterfactual. AVITAS tables, which allowed us to derive the AVITAS values for these aircraft, were provided to us by Air NZ.

■ Route groups

Route groups are groupings of city-pairs which form the basis of the accounting arrangements between the airlines. Transfers and cost-savings are allocated on the basis of route groups. The mapping between city-pairs and route groups was provided to us by the airlines and is presented below in section 3 below.

2 Explanation of sheets in the model

This section explains the purpose of each of the sheets in the spreadsheet model provided to the NZCC and ACCC.

■ Info

This sheet sets out the carrier codes and colour codes used in the rest of the model.

■ Inputs

This sheet contains input information used predominantly in the Cournot calculations. It contains average fares, price elasticities of demand, base case passenger volumes and base case capacity – all by city-pair.

■ Control

The control sheet contains the major assumptions used to derive the results in the rest of the model, including the VBA scenario (no, medium or high), elasticities, demand and capacity

growth assumptions, WACC, passenger shares by major route, cost differentials between FSA and VBA/VBA+ and the price factor reduction for NZ Express. It also includes assumptions used in the tourism analysis and the exchange rate used in the analysis.

- F-sch

This sheet details the factual schedules or the schedules for the future with the Alliance. It first sets out the schedules in terms of departures per week by city-pair and aircraft type for each airline operating the city-pair and then in terms of seats per week. The seat per week information is then used to calculate capacity shares.

- CF-sch

This sheet is identical in format to the factual sheet but details the schedules that would exist in the future without the Alliance.

- VBA

This sheet sets out the three scenarios for the VBA entry schedules – no, medium or high. Depending on the scenario chosen in the 'Control' sheet, these values are read into the factual and counterfactual schedule sheets.

- Cournot

The Cournot sheet is used to calculate the solution price and passenger volumes. Columns D-H read in base case values, columns J-AI read in capacity shares for the factual from 'F-sch' and calculate combined market shares for the parties under the Alliance. Columns AK-BI read in capacity shares for the counterfactual from 'CF-sch'.

Columns BK-CL are used to calculate the solution price and quantity for the factual. Columns BK-CI calculate the 'marginal cost' for each of the airlines operating on the city-pair. It is important to note that these values do not attempt to reflect the real marginal cost of the airlines' operations, they are simply a parameter in the model used to calculate the mark-up to determine the solution price. Column CJ calculates the number of airlines operating on the city-pair. Column CK calculates the solution price and column CL calculates the solution quantity.

Columns CN-DN do exactly the same for the counterfactual.

- Unit Costs

The 'Unit cost' sheet contains the costs for each of the three cost drivers used in the cost savings calculation – passengers, departures and blockhours. Unit costs are presented for both Qantas and Air NZ by major route and aircraft type. This sheet also contains overhead cost information, however, this is not used in the cost savings calculations.

- BHrs

This sheet sets out the number of blockhours (ie flying time plus ground time) for each city-pair by aircraft type.

- CapCost

This sheet sets out the aircraft fleets that Qantas and Air NZ would use in the future with and without the Alliance. It also presents the average age of the aircraft in the fleet, the asset lives, and the AVITAS values. It then uses this information to calculate the annual capital costs (ie depreciation and the opportunity cost of capital). It calculates the total blockhours for each aircraft type and the annual capital costs per blockhour.

- FCD

This sheet calculates the factual cost drivers for the cost savings calculation. It calculates number of passengers carried by Air NZ and Qantas on each city-pair and aircraft type. This is done by reading in passenger volumes from the 'Cournot' sheet and capacity shares from the 'F-sch' sheet. It calculates number of departures per year by airline, city-pair and aircraft type by reading in information from the 'F-sch' sheet. It calculates number of blockhours per year by airline, city-pair and aircraft type by reading in information from the 'BHrs' sheet and multiplying this by the number of departures per year. Capital costs by airline, city-pair and aircraft type are also calculated in this sheet by reading in information from the 'CapCost' sheet and multiplying this by the number of blockhours per year.

- FC

This sheet calculates the costs associated with the factual schedule and passenger volumes. It multiplies the unit costs from the 'Unit cost' sheet by the cost drivers in the 'FCD' sheet to arrive at the total variable costs for each city-pair. This sheet also sums the capital costs from the 'FCD' sheet to arrive at a single capital cost figure for each city-pair.

- CFCD

This sheet performs exactly the same calculations as the 'FCD' sheet except for the counterfactual.

■   CFC

This sheet performs exactly the same calculations as the 'FC' sheet, except for the counterfactual.

■   Pax burn

This sheet calculates the cost savings associated with the higher prices in the factual compared with the counterfactual. These cost savings are later netted off the total cost savings figure. Columns C-H calculate the difference in the number of passengers carried in the factual (from 'FCD' sheet) and counterfactual (from the 'CFCD' sheet) by aircraft type for Air NZ and multiplies this number by the relevant unit cost from the 'Unit cost' sheet. Columns J-P do the same for Qantas. Column I sums the Air NZ cost savings associated with higher prices and column Q does the same for Qantas. Column R sums column I and Q.

■   Analysis

This sheet calculates the net cost savings, the deadweight loss (DWL) and the transfers and allocates cost savings between Australia and New Zealand. Columns D and E read in the solution price for the factual and counterfactual from the 'Cournot' sheet. Column F calculates the percentage difference between these prices. Columns H and I read in the solution passenger volumes from the 'Cournot' sheet and column J calculates the percentage difference between these volumes.

Column L calculates the total cost savings by deducting the total variable and capital costs associated with the factual (from 'FC' sheet) from the total variable and capital costs associated with the counterfactual (from 'CFC' sheet). Column M reads in the cost savings associated with higher prices from the 'Pax burn' sheet and column N calculates the net cost savings by deducting column M from column L. Column O calculates the cost savings in percentage terms. Columns Q and R read in the marginal cost figures from the 'Cournot' sheet for the factual and counterfactual, respectively. Column T calculates the total DWL and column U calculates the total transfers.

Columns X and Y calculate capacity by route group. Column Z calculates total capacity. Column AB aggregates cost savings by route group. Column AD allocates cost savings by

route group to Australia using the accounting formula agreed between the parties and column AE does the same for New Zealand.

- Alloc

This sheet allocates the DWL and transfers between Australia and New Zealand.

Columns C and D read in the DWL and transfer values from the 'Analysis' sheet. Columns F-H allocate the DWL to New Zealand, Australia and foreigners based on passengers shares in the 'Control' sheet.

Columns X-M calculate transfers from consumers to producers in New Zealand, Australia and foreign countries. This allocation is again based on passenger shares in the 'Control' sheet.

Column P calculates transfers to New Zealand and Australian producers based on capacity. The tables in K54 to R67 then allocate the New Zealand and Australian transfers to producers between Australia and New Zealand based on route groups and the accounting formula agreed between the parties.

- DF Costs

The purpose of this sheet is to calculate the costs of the new direct services - Auckland – Adelaide, Auckland – Hobart, Auckland Canberra and Wellington – Canberra - in the factual schedule.

The costs for the new direct flights were calculated using the same cost drivers (passengers, block hours and departures) as the other Tasman services in the factual schedule. The forecast number of passengers on each new city pair was provided by the airlines. The block hours were also provided by the airlines, and the number of departures was provided in the factual schedule.

- Sum

This sheet summarises the cost savings, DWL and transfer results and calculates net transfers as transfers from consumers less transfers to producers for both New Zealand and Australia.

- Tourism sum

This sheet calculates the impact on each country of the variance in visitors due to the factual and counterfactual schedules. The calculation uses the outputs from the Cournot model, and historic passenger trends, to calculate the change in visitor arrivals to Australia and New Zealand. Historic average spend data is used to value these changes.

- Freq

Based on the improved co-ordination of schedules under the factual schedule, the departure and arrival times on each Tasman city pair were analysed separately. Where departure times for flights on the same sector overlap, a new schedule was calculated, spreading times more evenly throughout the day, based on the utilisation of the aircraft scheduled to operate.

- Direct

This sheet calculates the value of the time saved by travellers as a result of the new direct services - Auckland – Adelaide, Auckland – Hobart, Auckland Canberra and Wellington – Canberra - in the factual schedule.

The variance was calculated between the time taken for the new direct flight, and the current fastest travel time between each city pair (including the time spent waiting for connecting flights). This variance reflects the benefit to travellers between these city pairs, and a value is calculated to quantify this benefit. This value is later used to calculate the net benefit of the new direct services, once the costs of the new direct services have been subtracted.

- B&D

This sheet is a summary sheet, reading in and summarising results from other sheets.

- TO-rep

This sheet presents a trade-off sheet for Australia, New Zealand and in total of each of the benefits and detriments calculated in the model. This sheet is read into the summary file.

- VBA Costs

This sheet calculates the costs for the VBA factual and counterfactual schedules following the same methodology as used in the 'FC' and 'CFC' sheets.

- VBA Profit

Using the cost results from 'VBA Costs' and the price and quantity results of the Cournot model, this sheet calculates the profitability of VBA entry for the VBA entry scenario chosen in the 'Control' sheet. This is to demonstrate that VBA entry is profitable and more so under the factual than the counterfactual.

3 The main formula used in the model

This section identifies and explains the main formula used in NECG's model.

- Cournot formulas

The main formulas in the Cournot sheet are those that calculate the solution price and quantities. On most city-pairs the proposed Alliance results in higher concentration than the future without the Alliance. The concentration levels, captured through market shares are then used to evaluate the change in the DWL between the factual and counterfactual. The concentration index is given by:

$$HHI = \sum_{i=1}^{n} s_i^2$$

and the solution price is given by:

$$\frac{P - C_i^{'}}{P} = \frac{\alpha_i}{\varepsilon}$$

where:

$C_i^{'}$ is the marginal cost of firm i

α_i is the market share of firm I

ε is the elasticity of demand

The price and concentration index are linked by:

$$\frac{P - \overline{C}}{P} = \frac{HHI}{\varepsilon}$$

with average marginal cost.All other things equal, a higher concentration index will result in a higher price mark-up over cost.

To translate mark-ups into prices the model is calibrated to the base case where the slope of the demand function is given by:

$$S = \frac{\partial Q}{\partial P} = -\varepsilon(Q,P) \cdot \frac{Q}{P}$$

Rewriting the price formula, we determine a marginal cost estimate for each airline for both the factual and counterfactual:

$$C_i^{'} = P \cdot \left(1 - \frac{\alpha_i}{\varepsilon}\right)$$

The equilibrium price is the solution of the system of equations defined by these marginal costs plus an identity condition (sum of all market shares equal unity). The solution price for the factual and counterfactual is then calculated as a function of:

- marginal cost of all airlines operating on the city-pair,

- the initial price,

- the price elasticity of demand (or the slope of the demand function); and

- the number of airline operating on the city-pair

$$P = \frac{- \text{Initial Quantity} + S \cdot \left(\text{Initial Price} + \sum_{i=1}^{n} C_i^{'}\right)}{(n+1) \cdot S}$$ The solution quantity is then calculated as the base case quantity plus the change in quantity due to the price changes (ie (solution price – initial price)/initial price * price elasticity of demand * initial quantity), plus the change in quantity due to the capacity change (ie (factual or counterfactual capacity – initial capacity)/initial capacity * capacity elasticity of demand * initial quantity).

- Capital costs

Annual capital costs are calculated as the sum of depreciation and the opportunity cost of capital. Depreciation is calculated using the straight-line methodology which involves dividing the written down value of the asset by the remaining asset life. The cost of capital is calculated as the capital charge (referred to in the model as the WACC, but not intended to

necessarily reflect the WACC as it would be determined using the CAPM) multiplied by the written down value of the asset.

- Deadweight loss

The deadweight loss associated with the Alliance is calculated as the difference between the deadweight loss associated with the factual less the deadweight loss associated with the counterfactual. The area that is calculated is illustrated by sum of the areas marked 1, 2 and 3 in the diagram below. Hence, the formula for calculating the deadweight loss is:

For area 1 =   ((counterfactual quantity – factual quantity) *

(factual price – counterfactual price)) * 0.5

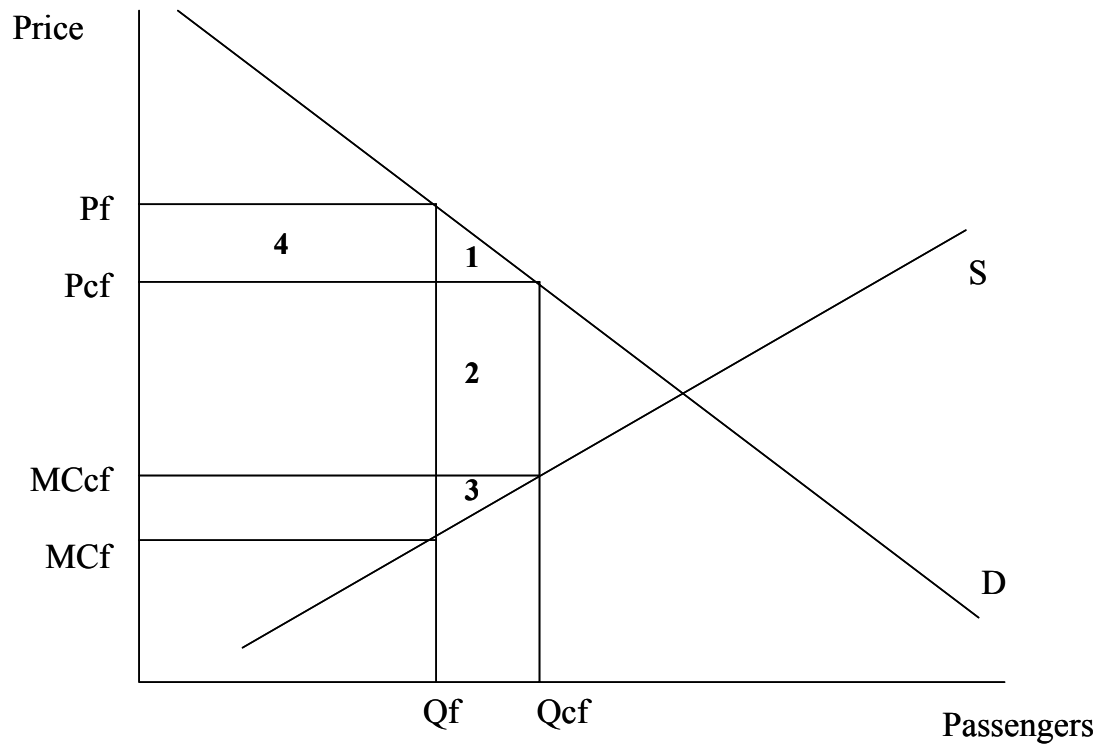For area 2 =   (counterfactual quantity – factual quantity) *

(counterfactual price – counterfactual MC)

For area 3 =   ((counterfactual quantity – factual quantity) *

(counterfactual MC - factual MC)) * 0.5

or for the whole area:

(counterfactual quantity – factual quantity) * (0.5 * ((factual price – counterfactual price) + (counterfactual MC – factual MC)) + (counterfactual price – counterfactual MC))

■   Transfers

The total wealth transfer is identified in the above diagram as area 4 and is simply the difference between the factual and counterfactual price multiplied by the factual quantity or:

(factual price – counterfactual price) * factual quantity

■   Allocation of cost savings

Cost savings are allocated on the basis of the accounting formula agreed between the parties. This formula requires city-pairs to be mapped into route groups as follows:

City-pair	Route group
AKL-SYD	Tasman
AKL-MEL	Tasman
AKL-BNE	Queensland
WLG-SYD	Tasman
WLG-MEL	Tasman
WLG-BNE	Queensland

CHC-SYD	Tasman
CHC-MEL	Tasman
CHC-BNE	Queensland
AKL-PER	Tasman
AKL-CNS	Tasman
SYD-ZQN	Tasman
AKL-NLK	Tasman
ALK-NOU	Tasman
AKL-NAN	Pacific Islands
AKL-APW	Pacific Islands
AKL-TBU	Pacific Islands
AKL-RAR	Pacific Islands
AKL-PPT	Pacific Islands
NAN-LAX	Pacific Islands
TBU-APW	Pacific Islands
APW-LAX	Pacific Islands
RAR-LAX	Pacific Islands
PPT-LAX	Pacific Islands
NAN-RAR	Pacific Islands
RAR-PPT	Pacific Islands
AKL-HNL	Pacific Islands
AKL-LAX	AKL-LAX
LAX-LHR	Atlantic
AKL-SIN	Singapore
AKL-HKG	Hong Kong
AKL-TPE	Taiwan
AKL-NRT	Japan
AKL-KIX	Japan
AKL-NGO	Japan
AKL-WLG	Domestic NZ
AKL-CHC	Domestic NZ
AKL-DUD	Domestic NZ

CHC-WLG	Domestic NZ
CHC-ZQN	Domestic NZ
AKL-ZQN	Domestic NZ
WLG-DUD	Domestic NZ

The cost savings for the Tasman route group are reduced by the costs associated with the new direct flights – AKL-ADL, AKL-HBA, AKL-CBR and WLG-CBR – that the airlines propose to operate.

Cost savings are then allocated between Australia (ie Qantas) and New Zealand (ie Air New Zealand) by allocating 60% on the basis of capacity and the remaining 40% equally.

- Allocation of transfers

Allocation of transfers from consumers to producers is done on the basis of passenger shares. Total transfers are simply multiplied by the share of Australian, New Zealand and other foreign residents carried on each route. The allocation of transfers from producers to consumers is based on the accounting formula agreed between the parties and as set out above for cost savings.

- Allocation of deadweight loss

The allocation of the deadweight loss is done on the basis of passenger shares in exactly the same way as transfers from consumers to producers.

- Tourism formulas

The output for each sector from the Cournot model is used as the starting point for calculating the tourism benefit or detriment to each country. The Cournot model provides the total change in passengers by city-pair. The total passenger change is then split, using historic passenger shares by country of origin, to determine whether the passenger change will be a benefit or a detriment to Australia and New Zealand. For example, on the Auckland – Sydney sector, a reduction in the number of New Zealander's travelling is a detriment to Australia, as these people no longer travel from New Zealand to Australia. Using the historic average expenditure a value can be placed on the change in visitor numbers from each country.

Added to this calculation are the additional tourists that result from increased promotional expenditure by Qantas Holidays, and the increased efficiency of promotional activity by both the airlines and the tourist bodies. These tourists are also valued using the historic expenditure values.

- Frequency formulas

It is assumed that passenger demand to travel is spread evenly over five minute periods between 5am and 12pm. The number of passengers on each city-pair was divided into 228 five minute periods to reflect the linear demand. The flight time closest to each five minute period was calculated, representing the difference between the desired and actual departure times. The variance for each five minute period is aggregated to calculate a daily total. The variance between the factual and counterfactual daily totals are then calculated. Using the historical business and leisure passenger proportions on each sector, a valuation is placed on the time variation between the factual and counterfactual schedules.

- Direct flight formulas

The costs for the new direct flights were calculated using the same cost drivers (passengers, block hours and departures) as the other Tasman services in the factual schedule. The forecast number of passengers on each new city pair was provided by the airlines. The block hours were also provided by the airlines, and the number of departures were provided in the factual schedule.